REMARKS

The non-final Office Action dated December 26, 2006 has been received and carefully considered. The above amendments and the following remarks are being submitted as a full and complete response to the Office Action.

Claims 8 and 9 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite.

With respect to claim 8, the Examiner objected to the expression "wherein a rotary shaft is screwed with said piston in said axial direction" because, in the Examiner's opinion, it was unclear whether the rotary shaft was rotated relative to the piston or was fixed to the piston via a threaded screw connection. In order to avoid this potential ambiguity, claim 8 has been amended to clarify and state specifically that the rotary shaft "is rotatable relative to said piston". Moreover, it is noted that claim 8 depends from claim 1, which states that the piston is displaceable in an axial direction of the body under a rotary driving action of the driving source, whereas dependent claim 8 sets forth the rotary shaft as being connected to a drive shaft of the driving source. Therefore, it is abundantly clear that the rotary shaft displaces the piston by means of a rotary-moving threaded engagement with the piston.

With respect to claim 9, the Examiner objected to the phrase stating that the "rotary shaft is retained rotatably by a bearing". Taking into account the Examiner's observation that the shaft is actually retained axially, claim 9 has been amended to correctly state that the "rotary shaft is retained axially in said body and is rotatable through a bearing".

Claim 5 was rejected under 35 U.S.C. § 112, second paragraph, as allegedly omitting essential elements. The Examiner notes that no structure has been recited for controlling the displacement amount of the piston in response to the detected pressure. In order simply to avoid the rejection, the objectionable phrase in claim 5 has been eliminated, so that the claim no longer implies that a displacement amount of the piston is controlled based on a detected pressure value. Rather, claim 5 sets forth the structure, fully supported in the present specification, of a "detecting section provided in said body for sensing a pressure of said fluid flowing through said fluid passages of said body".

The applicant respectfully requests that the Examiner reconsider the rejections raised under 35 U.S.C. § 112 and, in light of the amendments and reasons discussed above, withdraw these rejections.

Claims 1 to 4 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Bergandy (U.S. Patent No. 4,569,378) in view of Rosen (U.S. Patent No. 2,807,213).

Bergandy discloses a filling machine comprising a piston 11 drivable by a piston rod connected to a drive bar 6 operated through eccentric driving members 16, 17. A flexible rolling diaphragm 9 is disposed above the piston 11, as shown in FIG. 2, whereby through reciprocating movements of the piston and diaphragm, and operation of valves 25, 27, liquid can be pumped from a liquid supply 24 to a container 7 intended to be filled with the liquid.

In contrast to the simple diaphragm disclosed in Bergandy, the present invention includes a valve plug membrane (28) connected to a piston (86) and provided with a shaft section (110) which is screw-fitted into the piston (86), a thick-walled main valve body section (114) formed under the shaft section (110), and a flexible thin skirt section (116) extending radially outwardly from an upper surface of the main valve body section (114) and from the piston (86). Moreover, the claimed pump apparatus includes a seat section (30) disposed vertically lower than the first port (54) and the second port (56) at a lower portion of the pump chamber (29), wherein the valve plug membrane (28) can be seated in abutment on the seat section (30) in order to shut off communication between the first port (54) and the second port (56). In other words, the present invention is not merely a pumping mechanism as disclosed in Bergandy and Rosen, but also operates as a valve, which can close or open communication between fluid ports.

More specifically, with respect to Rosen, this reference was cited merely for its disclosure of a pump mechanism in which pistons thereof are driven by an electric motor. Rosen clearly does not disclose any features relevant to the claimed structure of the valve plug membrane, including the shaft section, the thick-walled main valve body section, and the flexible skirt section. Rosen similarly lacks any kind of seat section, as set forth in amended independent claim 1.

Therefore, it is respectfully submitted that the cited references do not disclose or suggest the features of the present invention, as now set forth in amended claim 1. Dependent claims 2 to 4 are of course patentable over the cited prior art, at least for the same reasons as claim 1.

Claim 5 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Ogden et al. (U.S. Patent No. 5,415,528) in view of Bergandy.

Presumably, the Examiner is citing Ogden as teaching a detecting section provided in a pump body for sensing a pressure of a fluid flowing through the fluid passages of the pump body, wherein the displacement amount of a piston is based on a detected pressure. Nevertheless, the Examiner has acknowledged that Ogden does not disclose or suggest the piston and valve plug membrane structure set forth in claim 1, and for this purpose has relied on Bergandy.

Bergandy, however, has been discussed in detail above, and does not disclose the claimed features of a valve plug membrane (28) connected to a piston (86) and provided with a shaft section (110) which is screw-fitted into the piston (86), a thick-walled main valve body section (114) formed under the shaft section (110), and a flexible thin skirt section (116) extending radially outwardly from an upper surface of the main valve body section (114) and from the piston (86). Moreover, neither Bergandy nor Ogden discloses a pump apparatus as claimed, that includes a seat section (30) disclosed vertically lower than the first port (54) and the second port (56) at a lower portion of the pump chamber

(29), wherein the valve plug member (28) can be seated in abutment on the seat section (30) in order to shut off communication between the first port (54) and the second port (56).

Accordingly, it is respectfully submitted that Ogden et al. and Bergandy, even in combination, do not suggest the features of the amended claims, including dependent claim 5.

Claims 6 and 7 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Bergandy and Rosen as applied to claim 1, taken further in view of Taplin (U.S. Patent No. 3,250,225).

Taplin discloses a rolling diaphragm type pump apparatus making use of check valves provided in ports defined within the body. Nevertheless, Taplin does not make up for the deficiencies of Bergandy and Rosen discussed above. Therefore, claims 6 and 7 should be allowable, as dependent claims, substantially for the same reasons as amended claim 1.

Claims 8 and 9 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Bergandy and Rosen as applied to claim 1, taken further in view of Henry (U.S. Patent No. 5,577,433).

Henry has been cited as disclosing a piston operated through action of a screw drive. However, even if it were possible to incorporate the screw drive mechanism of Henry in the apparatus of Bergandy, which is doubtful given the different structures and purposes of the respective apparatuses, Henry still cannot make up for the deficiencies of Bergandy and Rosen discussed above. Therefore, claims 8 and 9 should be allowable, as dependent claims, substantially for the same reasons as amended claim 1.

Claims 10 and 11 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Bergandy and Rosen as applied to claim 1, taken further in view of Ghiardi (U.S. Patent No. 1,580,131).

Ghiardi was cited allegedly as being relevant to the claimed rotation-preventive pin, which is attached to the piston and engages with an engagement groove. Nevertheless, Ghiardi discloses nothing relevant to the claimed valve plug membrane (28) and seat section (30). Thus, once again, claims 10 and 11 should be allowable, as dependent claims, substantially for the same reasons as amended claim 1.

Claims 12 and 13 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Bergandy and Rosen as applied to claim 1, taken further in view of Oxnard (U.S. Patent No. 1,085,818).

Oxnard was cited as disclosing a piston having grooves formed on an outer tapered surface thereof. Again, however, Oxnard discloses no features remotely relevant to the claimed valve plug membrane (28) and seat section (30). Therefore, claims 12 and 13 should be allowable, as dependent claims, substantially for the same reasons as amended claim 1.

For the foregoing reasons, it is respectfully submitted that the claimed invention is not anticipated and would not have been obvious to a person skilled in the art at the time the present invention was made. Reconsideration and withdrawal of the rejections, and allowance of pending claims 1 to 13, is respectfully requested.

No additional fees are currently due. Notwithstanding, in the event that fees, or deficiencies in fees, are deemed necessary in connection with this or any accompanying communication, such fees may be charged to the Attorney's Deposit Account No. 07-2519.

Respectfully submitted,

Paul A. Guss
Reg. No. 33,099
Attorney for Applicants

CS-30-021009

775 S. 23rd St. #2
Arlington, VA 22202
Tel. 703-486-2710